Resisting Planned Obsolescence: 3D Printing, Repair, and Being a Maker

For my part here on the panel, I’d like to talk a bit more about our 3D printer, and how both its design flaws and affordances engage with conversations on intellectual property, planned obsolescence, and the right to repair. My journey begins with an exploration of the 3DPrinting subreddit, a forum for makers to share information on purchases, photos of objects made, and, of greatest interest to me, modifications for the printer.

So on the subreddit, the Monoprice Maker Select v2 has been identified as one of the most popular 3d printers used in the community. Though it’s a common choice for hobbyists, it has a few well-known drawbacks.

The most notable of the problems identified for this printer is the power connector for the build plate. Because the Melzi board (essentially the motherboard), is not rated for the current that passes through, it’s susceptible to burnout and possibly even catching on fire. In a buyer’s guide thread, moderator Veive advises using PLA (because of the lower required heat) and either setting the build plate to lower temperatures or just avoiding warming it up. However, user Trylliana responds that burnout is still inevitable because the build plate draws full power regardless of the settings. I’ll note here quickly that I came across one suggestion that rather than being unable to handle the current, it was actually a problem of resistance that leads to the heat damage on the board.

Interestingly, stories of fires are quite common on the 3d printing subreddit. As recently as early February, there was a new post about a power connector fire. A couple of users suggested removing the Monoprice Maker Select from the monthly buyer’s guide mega thread until the printer was updated to deal with the power issue. However, the Maker Select remains on March and April’s guides. A recent refresh is reported to relieve the problem, though it has been pointed out that the supply has been mixed with previous v2 models, so recent purchasers of the printer, such as our group, still face the possibility of owning a defective product.

Concerns over the dangers associated with certain 3d printer control boards are perhaps superceded by the DIY/DIWO (Do It Yourself/Do it With Others) ethic of the community. Many Monoprice users recommend upgrading to a higher quality MOSFET or RAMPS board; plenty of guides exist for replacing the original hardware with a superior power module or Reprap shield. This commitment to personal maintenance extends beyond fixing device-breaking problems: unsurprisingly, there has been much work done to upgrade the base printer with modifications improving upon its design. Adding, of course, to the coolness factor of it all, these design fixes are made by the 3d printer itself.

On the site “3d Printer Wiki”, there is a page dedicated to mods for the Wanhao Duplicator i3. As Kyle noted, the Monoprice Maker Select derives from the Prusa i3. It’s actually a rebrand of the Wanhao Duplicator, which itself is based on the Prusa i3, so these mods are applicable to our printer.

There are a variety of mods; one popular mod is the Z brace, which adds rigidity to the extruder. Though the linear motion system that controls the extruder is generally credited with providing accuracy in 3d printing, the rigidity of the printer frame can aid in the precision.

**SHOW Toglefritz .GIF of “Honest review: The Printrbot Simple Metal (Kit)” video by Thomas Sanladerer**

In the .GIF, we see segments from the review video comparing two PrintrBot brand printers—one with a wooden frame and the other with a metal frame. As Toglefritz explains, the force of the motor on the printer will create movement on the extruder, even if the movement is quite subtle. On the Z brace Thingiverse page, designer Azza points to maker zsonybrasco’s comparison shot of hands made with and without the braces.

**SHOW Thingiverse page: “Z braces for Wanhao Duplicator i3, Cocoon Create, Maker Select, and Malyan M150 i3 3D printers.”**

As can be seen on the image, the striation on the hand on the right side of the photo is less visible than in its counterpart.

There are a multitude of mods identified as essential by Maker Select users: spring retainers for ease in adjustments to the build plate (SLIDE), a new fan duct (SLIDE), and replacement bearing blocks to prevent the belt from rubbing on the block (SLIDE).

Unfortunately, time didn't allow for me to make these mods. I got started on experimenting with the printer myself at a late stage, and it turned out I needed over 14 continuous hours to print all of the parts needed for the Z braces. Given the potential technical issues, i.e. fire, I did not want to leave the printer unattended over night, especially because we housed the Maker Select in the Maryland Institute for Technology in the Humanities. If I burned down MITH, I most certainly would not be standing here in front of you all right now. I did have just enough time, however, to make this very humble Allen Wrench holder, which itself took an hour and a half to print (SLIDE).

But what if I had burned down MITH? While I am the obvious culprit, I might try to introduce some ambiguity by pointing fingers at other parties. A recent report by the ALA on best practices regarding hosting of 3D printers suggests at the potential liability of the host library for the actions of the user. Do we lay the blame at the feet of the person doing the printing, the designer of the model, the manufacturer of the printer, or perhaps even the library itself for the access it gives to the printer? These questions bring to the fore both how we understand the responsibilities of the relevant stakeholders as well as the rights we have as users, as makers, and as consumers.

Delving into the world of 3d printing mods has been a particularly interesting part of this project for me, as it suggests at the great possibilities this device holds. Naturally, the introduction of a consumer product that has the capacity to make physical objects limited perhaps only by our imaginations has led to equal parts excitement and concern. The topic of intellectual property has been raised quite often, given the many opportunities made possible to infringe upon patented inventions or copyrights. While safe-harbor provisions of the Digital Millennium Copyright Act permit sites like Thingiverse to post potentially infringing materials so long as they make it clear they will comply with requests from copyright holders to take them down, 3D printing does not fit quite so easily into the regime of intellectual property law when it comes to maintenance and repair.

 This symposium is centered around the idea of digital ephemera, a concept made ubiquitous by planned obsolescence. 3D printers are no more secure from that design strategy than any other digital artifact. The Monoprice Maker Select v2 has already been displaced by the Maker Select Plus, an upgraded model that boasts an integrated power supply and a touchscreen, always a key ingredient in demonstrating one’s place on the cutting edge. This is certainly proven out when compared to the control knob we have on our box there, a design that reminds us of older analog technologies. Yet, our modest 3D printer here works to resist the capitalistic logic of planned obsolescence. As you might have gathered, the upgrade components can all be found for free on Thingiverse, all licensed under Creative Commons. Though the 3d printer can’t make a new power module, the part can easily be found on Amazon, eBay or a variety of other enthusiast websites.

In his presentation, Kyle brought up the RepRap project, short for *replicating rapid prototyper*. Aiming to create conditions under which makers can build 3D printers with as few resources as possible, the designs are available under a free software license. The reprap wiki has buyer’s guides and build manuals for eight different RepRap machines. Beyond the capacity of the machines to forestall planned obsolescence, we see here an ethic of making that seeks to circumvent values of private ownership. This is an integral countermovement, particularly in a moment in which legislators are starting to question the artificial restrictions placed on consumers seeking to repair broken equipment.

Several states legislatures have tried to introduce right to repair bills, requiring manufacturers to sell replacement parts to independent repair shops as well as individual consumers. Diagnostic manuals would be made open source, and repair professionals would also be allowed around software locks to restore electronics devices to factory settings. Nebraska’s state legislature led the charge recently with its “Fair Repair” bill, LB67. The issue was, in large part, spurred on by farmers seeking to fix their John Deere tractors by themselves. However, because the bill also dealt with electronics repair, it has attracted significant attention from tech companies like Apple. Lobbying ultimately led to the bill stalling out in Nebraska. Similar efforts in Minnesota and Tennessee have also been defeated or deferred. However, there are still eight other states considering their own versions of the bill.

These legal efforts point to the complexities of digital objects. When do we own the products we buy and when are we merely leasing them? This question perhaps felt more ambiguous when referring to things that existed only as bits, such as the music or games we purchase through digital distribution platforms such as iTunes or Steam. However, when the software is a part of a larger physical mechanism, one that ultimately has a singular purpose, the answer seems quite clear. After all, how do you misuse a tractor with hacked software?

As these things go, people have already found workarounds. According to a recent report from Vice Motherboard’s Jason Koebler, farmers are resorting to Ukrainian firmware to crack their tractor software. License key generators and reverse-engineered cables allow them to bypass security locks put in place by John Deere. It is in this hacking that I bring my discussion of 3D printing back into the fold. Here the farmers have reclaimed their status as makers, transgressing the imposed limits of their devices, perhaps opening the possibility of making something new with their tractors, perhaps something better, more reliable, more stable. If the risk of burning down a building wasn’t feasible for me or my group, perhaps we may want to forego using the Maker Select v2 and set our sights on a newer, shinier model. We may be justified in our safety considerations. Yet, we would also be returning to a way of thinking that follows the mass production model of consumption, ultimately shaping us back into consumers rather than makers.